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The Path to Global Coherence: The Role of the Global Consciousness Project 2.0

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ABSTRACT
The Global Coherence Initiative (GCI) is a science-based, international effort that conducts research on interactions and interconnectivity between human consciousness and the Earth's magnetic and energetic field environment, with the intention of promoting peace and harmony. This is measured by several interrelated initiatives, including the Global Coherence Monitoring System, the Global Tree Potential Monitoring System, the Global Coherence app, and citizen science projects. The newest addition to GCI is the Global Consciousness Project 2.0, which generates data from a globally distributed network of random number generators (RNGs). RNGs are designed to produce unpredictable sequences of 0 and 1 bits, but they exhibit coherent behavior among each other when there is coherent attention or emotion across humanity. This has been established by the original Global Consciousness Project. GCP 2.0 is extending this research with a larger, more sensitive network of 4000 RNGs, advanced technology, and fundamental measurements of quantum random processes.

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Introduction

The term "consciousness" carries rich significance, generally implying awareness or sentience among sentient beings. It encompasses the capacity to be aware of external objects in the environment, having internal reflections, or possessing a sense of selfhood (Wahbeh, 2021). The perception of a global consciousness expands one's awareness of self into a multi-dimensional world view that includes an identification with all humanity (Zhang et al., 2023).

The idea of a global or extended form of consciousness has roots in many ancient spiritual and philosophical traditions across cultures which have explored the interconnectedness of nature and all life and the concept of a universal consciousness. In the latter half of the 20th century, developments in consciousness studies and new paradigms in science began to challenge reductionist views. For example, David Bohm, suggested an implicate order

(Bohm, 1980), Rupert Sheldrake, proposed morphic resonance (Sheldrake, 1981), and Robert Jahn and Brenda Dunne conducted many studies on the ability of consciousness to influence physical processes, which have generally supported the perspective that consciousness and information can extend beyond individual minds (Jahn & Dunne, 2009). Roger Nelson, while working at The Princeton Engineering Anomalies Research lab with Jahn and Dunne, conducted numerous experiments exploring if individuals could influence the output of random number generators (Nelson, 2019). His findings led him to create The Global Consciousness Project (GCP) which was the first contemporary effort to scientifically explore interconnectedness and a form of human global consciousness. Using a globally distributed network of random number generators, the project demonstrated that global events and shared intentions could influence the correlation of random patterns generated by these devices (Nelson, 2014). The Global Consciousness Project 2.0 (GCP 2.0) is a new, expanded version of the original project driven by the motivation of fostering global health and harmony.

GCP 2.0 is being built and directed by the HeartMath Institute, including the authors of this paper. It is the newest addition to the Global Coherence Initiative (GCI), which was established in 2008 because we believe that we are at a point in the evolutionary history of human consciousness in which humanity has an opportunity to evolve to more interconnected, inclusive and cooperative social, economic and cultural systems around the planet. GCI is a science-based initiative, launched by the HeartMath Institute, a nonprofit research and education organization whose primary focus is on research that examines the dynamic relationship between human consciousness (physiology, attention, emotions, and collective behaviors, etc.) and Earth's energetic (electromagnetic) environment.

The following hypotheses guide GCIs ongoing collaborative research:

1. *Human, plant and animal health, cognitive functions, emotions and behaviours are affected by solar activity and planetary geomagnetic fields.*
2. *The earth's magnetic fields can act as carriers of biologically relevant and patterned information.*
3. *Each individual is connected to a global information field.*
4. *A critical mass of people creating heart-centered states of care, love and compassion will generate a more coherent field environment and information in the energetic field can benefit others and help offset the current planetary wide discord and incoherence. This more coherent energetic information can be encoded within the earth's geomagnetic fields, which act as carrier waves of physiologically patterned and relevant information.*

In essence, we are suggesting that there is an interconnection between all human beings and Earth's magnetic systems and that coherently aligned individuals with collectively shared intentions who are radiating physiologically coherent magnetic fields are able to more effectively resonate with and encode information in the planetary magnetic and energetic fields. This in turn can uplift other living systems within the field environment and can help

increase collective consciousness (McCraty, 2010). The results of some of the GCI studies indicate a profound connection between the Earth's magnetic fields and humanity (Al Abdulgader et al., 2018; McCraty et al., 2017; Timofejeva et al., 2021; Timofejeva et al., 2017). An overview, in depth discussion and supporting evidence for each of the above hypotheses can be found in (McCraty & Al Abdulgader, 2021).

There are five interrelated aspects of GCI: The Global Coherence Monitoring System, the Global Tree Potential Monitoring System, the Global Coherence app, the Global Consciousness Project 2.0, and initiatives that promote connection and community among participating individuals who are actively working to increase global consciousness.

Global Coherence Monitoring System

All biological systems on Earth are embedded in an environment of fluctuating magnetic fields that encompass a wide range of frequencies, and virtually every cell and circuit in biological systems can be affected (Bischof & Del Giudice, 2013; McCraty & Deyhle, 2015). Numerous studies have found links between human physiological rhythms and collective behaviors which are synchronized with solar and geomagnetic activity (Al Abdulgader et al., 2018; Halberg et al., 2011; McCraty et al., 2017; Tchijevsky, 1971; Timofejeva et al., 2017).

The Global Coherence Monitoring System (GCMS) is comprised of a network of six globally distributed ultra-sensitive magnetometers specifically designed to measure geomagnetic and resonant frequencies in Earth's magnetic fields, such as Schumann resonances, Alfvén waves and other field-line resonances. The measured frequency ranges of the Earth's magnetic fields overlap with the human physiological frequencies such as those of the human brain and cardiovascular systems. The GCMS network enables us to better understand how people and animals are affected by the rhythms and resonant frequencies in Earth's magnetic fields. Our data is freely available to other research groups who wish to explore how it may be utilized to study interconnectedness, solar and geomagnetic interactions, and prediction of earthquakes and other events.

Global Tree Potential Monitoring System

A new generation of scientists is showing that plants and trees are intelligent and aware, they process information, sleep, remember, and communicate with one another. They have at least 20 different types of senses including ones that roughly correspond to our five senses, but they also have additional senses that can do things such as measure humidity, detect gravity, vibrations and sense electromagnetic fields (Mancuso & Viola, 2015). Trees' behaviors exhibit a coordinated activity and response across the whole organism that require signaling and communication systems which include long-distance electrical signals, specialized vascular tissues, and production of chemicals used by the brain and nervous systems in humans and animals.

Researchers have also tracked the exchange of nutrients and chemical signals between trees through an invisible underground fungal network. The oldest trees, or "mother trees", function as hubs and help nourish their offspring, until they're tall enough to reach the light. In other words, trees recognize their seedlings as kin (Simard, 2021). Trees also cooperate by trading nutrients across species. For example, when evergreen species have sugars to spare,

they share them with deciduous species when they need them and vice versa. For the forest community, this cooperative and coordinated underground economy provides better overall health, more total photosynthesis, and greater resilience in the face of disturbance that allows them to thrive collectively (Simard, 2021).

Although there has been an abundance of new research and insights on the way trees communicate through chemical processes, there is far less known about the electrical life of trees. This Global Tree Monitoring project is part of the broader initiative to conduct interconnectivity research which is testing the hypothesis that all life forms are interconnected in a rich tapestry of intersecting energetic magnetic fields. HMI has created new equipment and software for simultaneously measuring the electrical potentials generated from trees located around the planet. This citizen scientist project encourages people from around the world to host a sensor on their favorite tree. The data from the network is being used to explore research questions such as: Are trees affected by human emotions? Do the electrical responses in multiple trees correlate to events that trigger an emotional outpouring in large numbers of people? Can trees help predict earthquakes? Do trees communicate energetically with each other over large distances and how does the biofield of trees have an uplifting effect on people?

The concept is that by looking at the activity of many trees simultaneously the smaller signal or response that may not be detectable in a single tree will become detectable when many trees are monitored. It's similar to looking for group coherence in trees.

We are currently exploring how trees' electrical potentials are affected by a number of environmental factors such as temperature, light, and water and also the gravitational pull on the earth by the sun and moon (earth tides) and changes in the Earth's magnetic fields. We are also monitoring global tree electrical activity to see if there may be similar responses in multiple trees to events that trigger an emotional outpouring in large numbers of people such as global peace days, disasters, and so on.

It is also possible that changes in tree potentials may provide an ideal way to measure changes in the electrical potentials that are taking place deeper in the earth that have been shown to occur before large earthquakes (Freund et al., 2006).

Global Coherence app

There is evidence that social coherence can be facilitated by providing feedback of individual and collective heart rate variability (HRV) coherence (McCraty, 2017). Group members' proficiency in heart coherence practices and degree of emotional connection or bonding appear to be the most important factors in mediating heart rhythm synchronization among group members (McCraty, 2017; Timofejeva et al., 2017). This is important as physiological synchronization correlates with increased pro-social behaviors, such as kindness and cooperation among individuals, improved communication, and decreases in social discord and adversarial interactions (McCraty, 2017). It has also been shown that heart rhythm synchronization between group members and the rhythms in the earth's magnetic fields is enhanced by practicing techniques that increase heart coherence (Timofejeva et al., 2021).

In order to help facilitate personal, social and global coherence the HeartMath Institute developed the Global Coherence app for mobile devices, that measures the heart rhythm

coherence of both the individual users and the collective coherence of groups of any size in real-time. The app includes a global map that shows the approximate location of current users which increases the feelings of connectedness among the participants from around the world. The app includes a listing of upcoming events, guides for how to increase heart-coherence levels, guided meditations and it provides notifications that suggest where to direct energetic contributions of heart-focused care and intention. Monthly full moon care focuses are often directed at places of unrest or natural disasters.

Global Consciousness Project 2.0

The newest addition to GCI is the Global Consciousness Project 2.0, which generates data from a globally distributed network of random number generators. These are designed to produce completely unpredictable sequences of 0 and 1 bits, but they exhibit coherent behavior among each other – known as Network Coherence – when there is emotional coherence across humanity. This has been established by the original Global Consciousness Project (GCP 1). GCP 2.0 is extending this research with a larger, more sensitive citizen scientist-based network of 4000 random number generators (RNGs), advanced technology, and fundamental measurements of quantum random processes.

GCP 1: A scientific bedrock

The original GCP 1 was created in 1997 by Dr. Roger Nelson and a group of researchers working in the boundary areas of physics and psychology. The purpose of the project is to detect, quantify and study subtle effects of human consciousness modulating the physical world at a global scale (Nelson, 2019). It was inspired by Teilhard de Chardin's vision of a "noosphere" or sheath of intelligence, emerging from the geosphere and biosphere of planet Earth (Teilhard de Chardin, 1959). The emphasis is on assessing if there is a type of global consciousness that is detected by increased correlations or coherence in the network of RNGs during a wide range of events where there is focused attention and collective emotions of a large number of people. Examples include events such as the Hindu Kumbh Mela pilgrimages in the Ganges and the September 11 terrorist attacks on the World Trade Center in New York (Nelson, 2019).

To obtain the data, GCP 1 created and maintained a world-spanning network of rigorously validated physical devices that produce strings of random numbers. These physical RNGs are designed for doing research that shows how human consciousness can affect random systems under controlled conditions. The original hypothesis of GCP 1 was that continuous parallel streams of time-synchronized data from the RNG network would show significant deviations from the expected normal randomness during events that produce a large-scale, widely synchronized focus of attention and emotional reactions. During the first few years of the GCP 1, the number of sites hosting RNGs grew to a maximum of about 70, with locations from Alaska to Fiji and on all populated continents and in nearly every time zone.

As of December 2015, 500 formal events had been analyzed in order to test the general hypothesis. Each test was specified *a priori*, that is, before any data were examined, and formally registered for public viewing on the project website. The prediction for each test was

that the data would depart from random expectation based on a pre-specified statistical measure. A wide variety of events were assessed in this manner including celebrations like New Years, shocking events like the terror attacks on September 11, 2001, natural tragedies such as the great earthquakes in Turkey and Haiti and the Asian and Japanese Tsunamis, and large-scale meditations and religious events like the Kumbh Mela in India (Nelson, 2019). The results showed strong correlations in some cases and virtually none in others. Overall however, the composite across all formal tests showed clear, highly statistically significant evidence that something remarkable happens when many people are drawn into a community with similar interests, focus and emotional responses. In other words, when an event evokes a synchronous emotional response in a large number of people, it creates a type of coherence in what we think of as a global field environment that interacts with and changes the output of physical devices based on random quantum-tunneling processes. *Post hoc* analysis revealed that, in some major events such as the September 11, 2001 attacks, and larger earthquakes the data deviations began several hours before the onset of the event, suggesting a type of pre-stimulus response along the lines of what is seen in human brainwaves and other physiological measures in non-local intuition studies (McCraty et al., 2004; Nelson, 2020; Radin, 2003). In these studies, the magnitude of the pre-stimulus response (prior to the occurrence of the event) is related to the magnitude of the response evoked by the actual event, suggesting that information about the future is enfolded in a non-local field (McCraty et al., 2004).

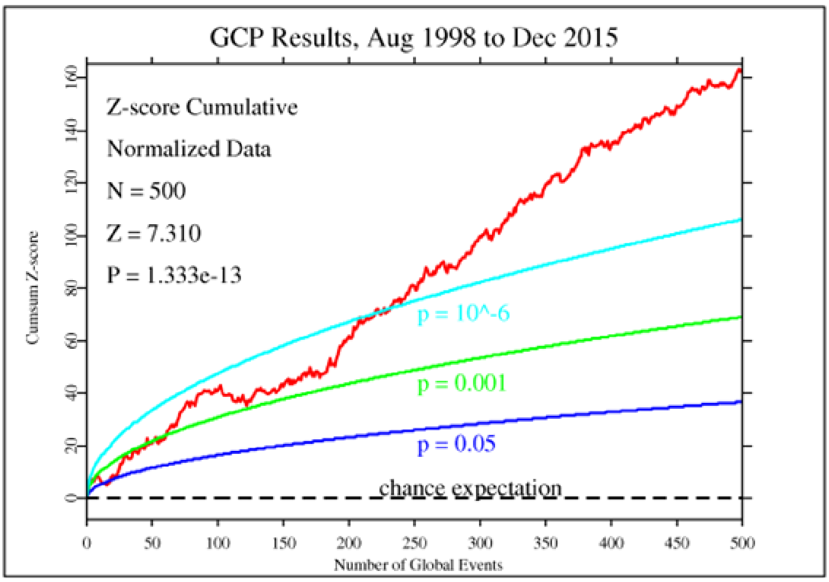


Figure 1. Graphical summary of the experimental results accumulated by the Global Consciousness Project with its worldwide network of RNGs over the course of 500 event database from August 1998 to December 2015.

The GCP 1 website (https://noosphere.princeton.edu) has complete information about its history, technology, and methods and the results page includes a table summarizing each of the formal tests with links to detailed descriptions and reports including multiple examples of coherent structure in the data that should have been random. A composite analysis across all the individual cases is presented in Figure 1, a chronological graph where the red line shows the steady accumulation of events with Network Coherence (also known as Network Variance in GCP 1), differing from the normal expected randomness in the global network (Nelson, 2019).

If there were no increase in the Network Coherence among the RNGs in the network, the red line would tend to be level while wandering randomly up and down but staying near the horizontal zero line. As the figure shows, the actual data have a steady upward trend indicating a highly significant Network Coherence. The figure also displays statistical significance bands for increasingly small p values beyond which the observed results become increasingly less likely due to random chance.

GCP 1's composite statistic after 17 years of data accumulation shows a 7-sigma departure from expectation, indicating a probability on the order of 1 in a trillion that the correlation of the data with global events is merely a chance fluctuation. In other words, events that created an emotional response in the collective consciousness of a large number of people induced a type of coherence in the global network of physical RNG devices. It was found that the RNGs begin to act like each other synchronously, even though they are fundamentally independent by design and are separated by great distances.

There are clear indications of non-random spatial and temporal structure (Nelson, 2019). The pairwise correlation (looking at simultaneous changes in all possible pair combinations of devices) is greater for large events where more people are emotionally engaged than small events. There is evidence suggesting that the Network Coherence effect declines with increased separation in a subset of small events that are relatively localized; for example, the World Series of baseball is of interest mainly in the United States. For truly global events the pairwise correlations do not depend on distance. In a recent analysis, we have found the effects are stronger when people are awake. Intriguingly, the data during an event show a pattern that looks like the classic evoked response to sensory stimuli in human brainwaves, suggesting that a global consciousness may have human-like qualities and evoked responses to a stimulus (Nelson, 2020).

The main hypothesis is general, but it was clear enough to predict events that cumulatively display Network Coherence. While these findings can't be taken as proof of global consciousness, the evidence clearly suggests that focused emotional energy and attention can interact with and affect the physical world. For example, variations in the effect appear to be linked to emotional categories. Given the basic premise of interconnection, it is no surprise to observe that events that embody or evoke love and compassion show a greater overall effect on the global network than any other emotion we examined. High levels of compassion correspond to stronger effects. In a related analysis we have found that a subset of events that promote "global harmony" (like Earth Day, web-organized global meditations, and major demonstrations for peace) show a strong effect (Nelson, 2019).

Figure 2 shows an example of a global harmony study which included 110 events between 1998 and 2012, which made reference to prayer, meditation, ceremony, ritual, healing, humanity, and Earth/nature. In this analysis, all event descriptions had a positive message for the future of humanity, promoted peace or healing to the Earth/nature and yielded a Stouffer's Z score of 3.283 with p = 0.00051.

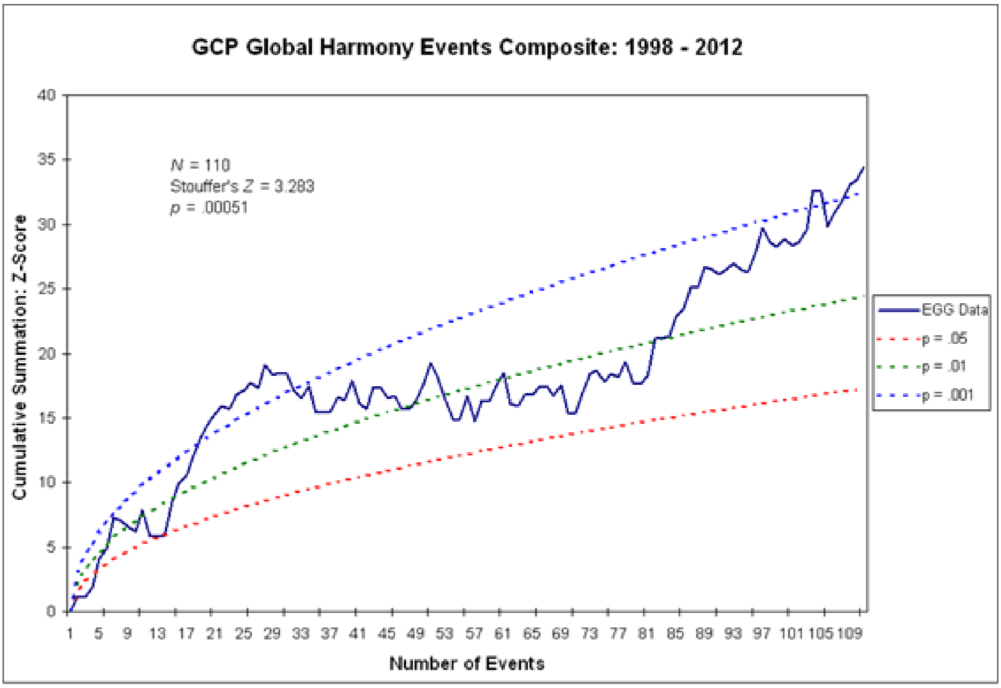


Figure 2. Global harmony composite analysis.

There have also been more direct observations of correlations between RNG network behavior and Earth's magnetic fields. Although the RNGs use several stages of "whitening" to ensure the random output cannot be affected by magnetic fields, power line fluctuations, etc., the long-term trend in the Network Coherence correlates with the solar radio flux (F10.7) data from the Sun over more than 20 years with a correlation of 0.83, as shown in Figure 3. This could be a correlation between the RNGs and natural forces or perhaps mediated by humanity's sentiment, as it has already been shown that humans are physically and emotionally affected by solar forces (McCraty & Al Abdulgader, 2021). This is an intriguing finding as it suggests an as yet unknown source of interaction and interconnectivity between solar activity and the RNGs in the GCP network.

On average, the deviations from randomness during a single event are small but in the aggregate they are clear, and we have determined that they are not attributable to mundane explanations such as electromagnetic radiation, excessive strain on the power grid, mobile phone use, etc. We don't yet know how to explain the mechanisms by which events of importance to humans affect the output of the GCP devices, but the correlations are clearly meaningful. They suggest something akin to the image held in almost all cultures of a unity

or oneness, based on a deep interconnection that is fundamental to life. Our efforts to understand these complex and interesting findings may contribute insight into the role of consciousness as a creative force in the physical world, as predicted by quantum physics.

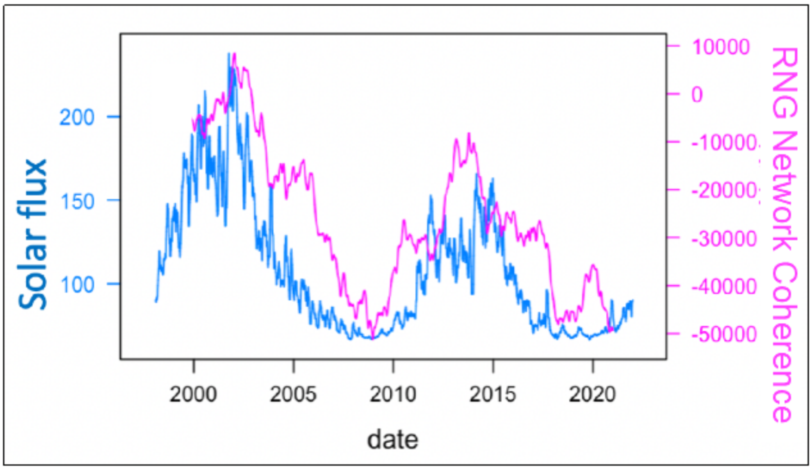


Figure 3. Time series data of the intensity of F10.7 solar radio flux compared to the long-term trend data from GCP 1.

GCP 2.0: The next generation

The scientific questions raised and the results found by GCP 1 are intriguing and important in the study of global interconnectivity. However, the research team at the HeartMath Institute believed that to go further in the scientific exploration of the effects of collective consciousness on the physical world and the global interconnectivity of all living systems, it was time to re-envision and expand the project. Technologies have dramatically advanced in the past 20 years since GCP 1 was created and useful new analysis tools have become available. Dr. Nelson has done extraordinary work by building on years of research at the Princeton PEAR lab to envision, create and maintain GCP 1 over the past two decades. He is now retired and felt the HeartMath Institute's research center was the ideal new home base for the project and the creation of GCP 2.0. In collaboration with a diverse team of scientific advisors, a substantially more comprehensive and robust version including new NextGen RNGs, infrastructure, databases, data analysis and visualization approaches and website have been created.

GCP 2.0 aims to expand on the goals and results of GCP 1 by measuring the direct effects of humanity's shared emotion and attention reacting to global events so humanity can better understand our interconnected universe. The project seeks to explore interconnectivity among humans and nature and to demystify the way in which large-scale or focused emotional experiences impact us and our environment. The hope is to spur positive social change when people realize the direct effect of our fundamental interconnectivity and how our intentions, and emotions can affect others and even our physical surroundings. In other words, what we "Feed the field" matters.

GCP 2.0 involves a network of RNGs, which are designed to produce completely unpredictable sequences of 0 and 1 bits. However, they exhibit coherent behavior among each other when there is emotional coherence and interconnectivity across humanity. Specifically, they display Network Coherence, a measure of excess correlations across devices. In other words, the RNGs across the network are producing more 1's at the same time or more 0's at the same time than is expected by random chance (Bancel, 2019; Nelson, 2019).

GCP 2.0 is a "citizen scientist" based endeavor that incorporates a new generation of stand-alone random number generators that are specially designed for the GCP 2.0 network making it much less expensive, as well as simpler and easier for citizen scientists to participate. The original GCP 1 system required partners to have a continuous running computer and broadband to participate. The GCP 2.0 devices are state-of-the-art NextGen RNGs based on quantum tunneling which were designed by experts in cryptography and computer science. Each of the GCP 2.0 devices has 4 independent RNGs. Our goal is to distribute 1000 of these RNGs around the planet. Half of the RNGs will be located in twenty five "clusters" with 20 devices in cluster cities with a large population or areas of special significance. The other 500 RNGs will be randomly distributed around the planet. Data from the global network of RNGs are continuously captured into a closed archive. At the time of this writing, the network is already many times larger than the GCP 1 network at its peak.

Another research area that GCP 2.0 is more suited to address is the fundamental mechanism of the GCP effect. In typical RNG experiments that analyze consciousness-matter interactions, such as GCP 1, only the final output of the RNGs has been recorded. However, in the NextGen RNGs, outputs are recorded at several points from the generation of raw data via quantum tunneling through the various stages of whitening to randomize the data until the final random output. This way, once an effect has been identified, there is also hope of tracing it back to its roots in the quantum electronic behavior of the device.

While GCP 1 was primarily an academic enterprise, GCP 2.0 uniquely expands the use of citizen science in the study of collective consciousness. This "crowd-sourcing" approach aims to engage as many people as possible at all levels, from simply hosting RNGs, to exploring or analyzing results, to helping define potential network problems and identify new research questions. By involving the public, citizen science provides our scientists with access to greater amounts of data, and increases awareness of our hypotheses while providing interested participants around the world the opportunity to contribute to critical new scientific understandings for dealing with complex global problems. With a much larger base of participants, it is natural that the network would be larger as well. This significant increase in the number of RNGs should increase the network's sensitivity to more accurately measure and analyze potential patterns that arise due to mass shifts in human consciousness.

This expected increase in sensitivity is extrapolated from a scaling analysis of the highly significant Z score obtained from the hypothesis registry in GCP 1. By randomly sampling a subset of the devices in each event, a Z score for the entire registry was generated for different scales, as shown in Figure 4. It appears that the more devices there are in the network, the clearer the significance of the result. Thus, a larger network may be more sensitive in reflecting the patterns in human consciousness.

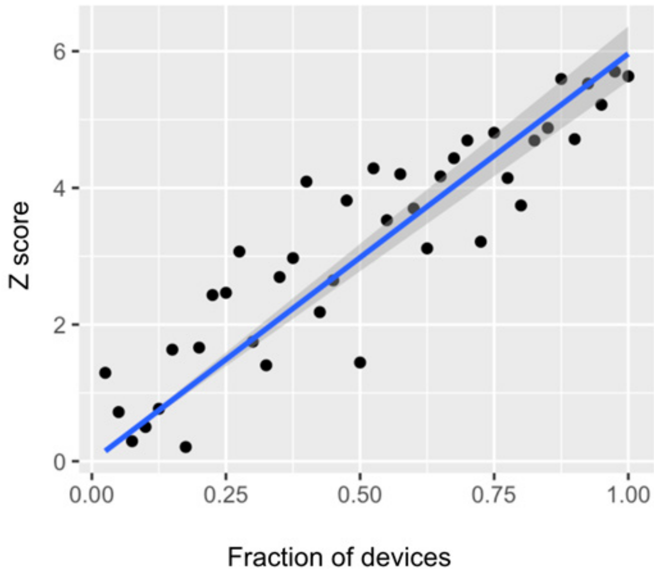


Figure 4. Scaling analysis: Stouffer's Z score for hypothesis registry compared to the fraction of online RNG devices included in the analysis. A linear fit line is superimposed.

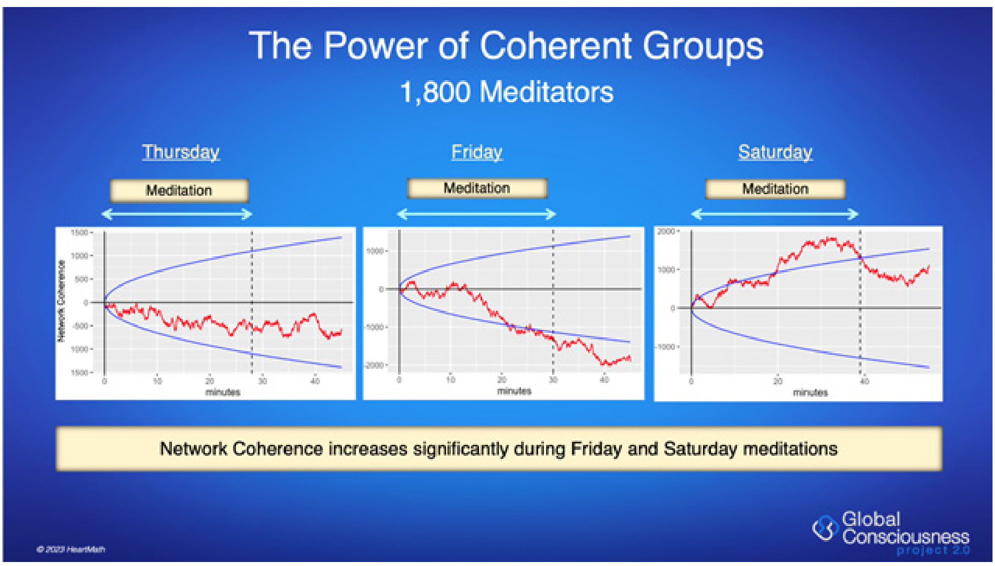


Figure 5. Network coherence (red) during coherence meditations over the course of a workshop, compared to blue chi squared significance envelopes (p = 0.05).

Another motivation for creating a larger network is asking new research questions, such as whether the influence of human consciousness on Network Coherence is affected by the distance between humans and/or devices. There has been some preliminary evidence in GCP 1 that it does, but the larger GCP 2.0 network may address this more clearly and give more specific details on the ways in which distance matters. As previously mentioned there are 25

focus cities (clusters) planned across the world which will each host 20 devices. This will allow researchers to concentrate on local effects in those areas in addition to the effect on the global Network Coherence. Additionally, there is some evidence that focused attention in smaller groups, such as meditators, can be as impactful as global events involving a less-focused populace. To study this, smaller groups of devices can be sent to concentrated events. This has been tried in the example of bringing a stack of 10 NextGen devices (total 40 RNGs) to a week-long meditation workshop led by Dr. Joe Dispenza in November 2022. Encouraging results are shown in Figure 5. During two of the three Coherence Healing meditations, the Network Coherence moved away from the expected value of 0 to exceed the significance envelope.

Discussion

Traditional materialistic physics has historically perceived reality as a composition of elementary, solid building blocks existing in an empty space. However, as we've uncovered electromagnetic fields and radioactivity and ventured into modern quantum physics, a new perspective is gradually displacing this materialistic outlook. In this fresh viewpoint, physical objects are no longer isolated entities but are seen as integral components within a holistic network of interconnections. Fields and relationships take center stage, blurring the lines between nonmaterial fields and the physical world (Bischof & Del Giudice, 2013; Penrose, 1989; Tiller, 1999).

In the early 20th century, biologists Paul Weiss and Alexander Gurwitsch proposed the existence of "biological fields" as pivotal in organism development. They posited that human beings consist of not only a solid physical body but also a field component extending beyond the body's confines (Beloussov et al., 2004). More recently, biophysics has substantiated that all living organisms are enveloped by a weak electromagnetic field, composed of optical photons, radio waves, microwaves, and extremely low frequencies (Bischof, 2008; Hammerschlag et al., 2015).

With compelling experimental proof of bio-electromagnetic fields, or "biofields," new biophysical models have emerged, depicting human existence as multidimensional. These models encompass various levels of nonmaterial field-related aspects of our thoughts, emotions, and intuitions (Bischof & Del Giudice, 2013; Ho, 2005; McCraty et al., 2009; Persinger, 2011; Pribram, 1991, 2013).

Several researchers have proposed theoretical field-based models of consciousness (Joye, 2020; Pribram, 2013), some of which propose consciousness is not solely a product of localized brain activity but emerges from interactions within a broader field or network. These models suggest that consciousness may be a non-local phenomenon, transcending the boundaries of individual brains, an extended type of consciousness (Clark & Chalmers, 1998; Hameroff & Penrose, 2014; Joye, 2020; Radin, 2009; Valencia & Froese, 2020; Wilson, 2005). Some proponents of extended consciousness point to support from instances of physiological synchronization in group settings, such as during meditation or collective consciousness practices. Participants may report shared experiences or enhanced connections, suggesting the potential for consciousness to extend beyond individual boundaries and interact with

others on both locally and non-locally (McCraty, 2015; McCraty, 2017; Radin, 1997, 2009; Valencia & Froese, 2020).

The ease and fluidity of social interactions are profoundly influenced by the natural establishment of spontaneous synchronization or connection between individuals. During meaningful conversations, a subtle interplay emerges, where people start to harmonize their physical movements, body postures, vocal tones, speaking rhythms, and the duration of pauses between their responses (Hatfield, 1994). Moreover, recent discoveries indicate that significant aspects of their physiology can also become interconnected and synchronized. In group dynamics, increased physiological synchronization has been demonstrated to boost conformity (Dong et al., 2015), foster cooperation and trust, and fortify the social bonds among group members (Wiltermuth & Heath, 2009). In order for physiological activity to synchronize among separate individuals, some type of meaningful signal (electromagnetic, light, tactile, sound, or quantum level information) must transport information between them (Currivan, 2017; McCraty, 2017).

As stated above, one of GCIs hypothesis is that the earth's magnetic fields can act as carriers of biologically relevant and patterned information. Numerous studies have shown that human and animal physiological rhythms are in the same frequency range as the resonant frequencies in the Earth's fields, and that both brain and heart rhythms are affected by and often synchronized to the rhythms of the Earth's fields, see (McCraty & Al Abdulgader, 2021) for an in-depth discussion.

One example is from a recent large global study with groups of twenty participants in each group, located in five countries. This study confirmed findings from a previous study (McCraty et al., 2017) showing that slower rhythms in participants heart rate variability (HRV) can and does synchronize to changes in the amplitude of resonant frequencies produced by geomagnetic field-line and Schumann resonances. In the study, the participants' HRV synchronization with the local magnetic field activity was calculated for each day over a 15-day period. On the sixth day, all of the participants participated in a 15-minute heart focused mediation called a Heart Lock-In®. During this meditation each participant's heart coherence was significantly increased and the synchronization of the heart rhythms between group members' were significantly with each other during the meditation period in all the groups. The surprise finding was that on the day of the 15-minute Heart Lock-In meditation, the synchronization between the participants' HRV and local magnetic field activity for all the groups was significantly higher than on the other days (Timofejeva et al., 2021). An additional analysis of the groups has also shown that over the 2-week period that the heart rhythms of the group members are significantly synchronized in the groups that have a higher level of bonding and emotional connections among the group members, but not in the groups with lower levels of connection (manuscript in preparation). This is an especially intriguing finding as most studies on physiological synchrony involve some type of joint action, such as walking, or singing together, game play, during communication, etc. In this case, the participants were going about their normal daily and nightly activities.

This finding lends support to emerging research related to extended consciousness which suggests the existence of an energetic field that interconnects individuals within a group, facilitating the simultaneous exchange of information among group members. For instance,

Bradley and Pribram developed a social communication theory to elucidate the common structural patterns found in diverse groups, irrespective of their size, cultural background, or degree of formal organization (Bradley, 1987). Their investigation revealed that most groups exhibit a cohesive global organization, forming an interconnected network of emotional bonds that collectively establish a multi-level hierarchy. By mapping the self-reported relationships among all potential pair combinations within a given group, they discovered a robust link between the number and structure of reciprocated positive emotional connections and control relationships. This correlation could predict the stability and performance of the group two years later. The most fitting theory to explain their data was one founded on a field concept, wherein information about the group's overall structure was disseminated concurrently to all members. Consequently, the group's collective consciousness, referred to as a "social hologram," could be accessed by any individual member. It is the aim of GCI and GCP 2.0 to further explore and understand the nature and validity of interconnectivity and extended consciousness, including additional studies of physiological synchronization in local and non-local scenarios.

Long term correlations have been found between the RNG network output and measures of societal sentiment such as Google Trends (Holmberg, 2022), stock market indices (Holmberg, 2020) and presidential approval ratings. Holmberg hypothesized that events triggering a strong emotional response should also trigger the need for information and that internet search trends should correlate with the GCP data, allowing for the hypothesis to be objectively tested. He used Google Trends search data to construct several search indexes that were correlated with GCP data aggregates using time series statistics. He found significant correlations between GCP data and indexes, which can be used to improve the statistical model's in-sample fit. Furthermore, he found that out-of-sample forecasts could be made more accurate if the GCP data is used. Holmberg's study provides support for the validity of the GCP data hypothesis and its practical usefulness.

Related to the discussion of interconnectivity and consciousness is well-known associations between solar activity and human consciousness. Russian scientist Alexander Tchijevsky first linked World War I's more intense battles to peak sunspot periods, and subsequent research revealed correlations between solar cycles, geomagnetic field disturbances, and larger societal trends, including increased violence, crime rates, social unrest, revolutions, and terrorist attacks (Ertel, 1996; Grigoryev, 2009; Halberg et al., 2011; Mikulecký, 2007; Persinger, 1999; Smelyakov, 2006; Tchijevsky, 1971). Importantly, heightened solar activity has also coincided with periods of human flourishing, marked by innovation, creativity in architecture, arts, science, and positive social change (Ertel, 1998). We now know that during elevated solar activity, increased ultraviolet (UV) energy and solar radio flux, measured by the 2.8 GHz signal (F10.7), are emitted by the sun (Lean, 2000). While the precise physiological mechanisms in humans and animals is not fully understood, these surges in solar and magnetic energy influxes may serve as sources of positive energy (Al Abdulgader et al., 2018). This likely arises from a coupling between the human brain, cardiovascular and nervous systems, and resonating geomagnetic frequencies like Schumann resonances, Alfvén waves, and other ultralow frequencies such as field-line resonances within the earth-ionosphere resonant cavity.

Interestingly, Shnol and colleagues at the Russian Academy of Sciences Institute of Biochemical Physics conducted numerous experiments over many years that examined the fine structure of radioactive decay processes, especially alpha decay at various locations on Earth. They point out that alpha is immune to trivial factors affecting the random distributions of decay rates. However, they found repeating patterns in the distributions of the measurements with periods of 24-hours, 27-days and 1-year that depend on the position of the Earth relative to the stars and the moon (Shnoll et al., 2000; Shnoll S.E. et al., 1999; Zenchenko et al., 2004). Radin has also found a moon phase correlation in the long-term GCP 1 data.

Taken together, the observed correlations between the GCP data, solar radio flux, and moon phase are important in the study of interconnectivity as they provide empirical support for the hypothesis that there is an interconnectedness or interrelatedness between human consciousness and external environmental factors like solar activity and lunar phases. By revealing links between human consciousness and celestial phenomena, it expands our understanding of the potential ways in which human consciousness and the environment interact. It suggests that factors beyond immediate social or psychological influences may impact collective consciousness and challenges the conventional view that human consciousness operates in isolation from others and external environmental factors. Hopefully these types of findings will encourage further investigation into how and why such connections might exist, potentially prompting a shift in how we perceive the boundaries of human consciousness.

Conclusion

In 1971, Apollo 14 astronaut and founder of the Institute of Noetic Sciences, Dr. Edgar Mitchell, had an epiphany in space on his way home from the moon regarding the oneness of all life and unconditional love as the organizing principle of the Universe. The idea that all life is one interconnected whole is becoming increasingly accepted as science advances, and increasingly obvious as the world moves into polycrisis. While the growing acceptance represents progress, we have not yet progressed to the point where our fundamental interconnectivity yields the possibility of effective solutions for sustainable global responses to the challenges humanity is facing. Our aim is to provide a scientific basis for an actionable strategy for harnessing collective consciousness for positive transformation during this massive global change moment.

The addition of GCP 2.0 to the Global Coherence Initiative scientific toolbox is an important addition for the study of energetic level interconnectivity, and the considerable empirical evidence GCP 1 has already provided. At most 70 RNGs were in use up to 2015 in GCP 1. The updated GCP 2.0 version plans some 4000 state of the art RNGs that are intended to address a number of new research questions. From a research perspective, increasing the number and strategic placement of RNGs should enable more definite findings.

The vision of the Global Coherence Initiative is to combine several globally focused networks of rich data sources to enable a new generation of research into the effects of global consciousness and interconnectivity. For example, we will be able to conduct studies where we have physiological monitoring of large numbers of people “feeding the planetary field”,

sharing coherent intentions and emotions while simultaneously monitoring potential effects in physical devices (RNGs), living systems (trees), and the earth's energetic field environment. Given adequate resources, the database structures supporting these studies will also include social metrics that can provide independent measures of human interests and emotional activity.

The planet is currently filled with discord, prejudice and war. Along with many issues being addressed, some of which are pointed out in this paper, the value of improving the science behind energetic interconnectivity and global consciousness is its vast applied potential to promote health, education and global harmony in transforming the planet and all sentient beings. GCP 2.0 promises to be a unique undertaking that opens new areas of consciousness research and promotes an increase in the baseline level of humanity's consciousness, one where love, compassion, cooperation and harmony are the new norm.

Disclosure statement

No potential conflict of interest was reported by the authors.

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